

# Nitrate in Groundwater

September 2013



# Why is Nitrate an Issue?

- Nitrate is one of the most common chemical contaminants found in California's groundwater sources
- Poses risk if consumed above health standard
- Expensive to cleanup
- Often affects communities that do not have means to treat their groundwater

Nitrate Fact Sheet GAMA -

[http://www.waterboards.ca.gov/water\\_issues/programs/gama/docs/coc\\_nitrate.pdf](http://www.waterboards.ca.gov/water_issues/programs/gama/docs/coc_nitrate.pdf)

# Contaminants in Groundwater

## Top Ten Detected above Health Standards\*

### Contaminant

Arsenic

Nitrate

Gross alpha activity

Perchlorate

Tetrachloroethylene (PCE)

Trichloroethylene (TCE)

Uranium

1,2-dibromo-3-chloropropane (DBCP)

Fluoride

Carbon tetrachloride

### Type of Contaminant

Naturally occurring

Anthropogenic nutrient\*

Naturally occurring

Industrial/military use\*

Solvent

Solvent

Naturally occurring

Legacy pesticide

Naturally occurring

Solvent

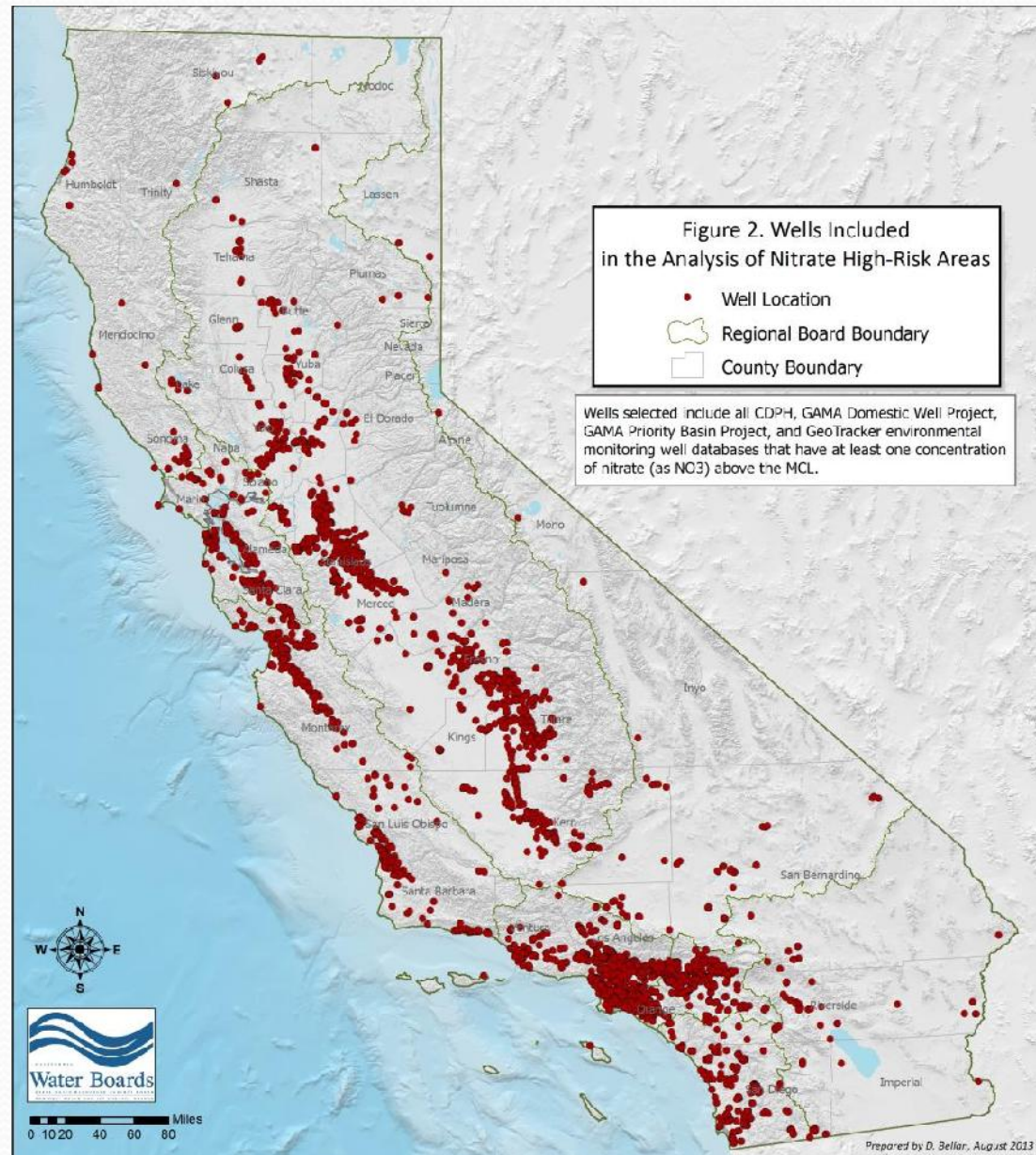
*\* AB 2222 Report to Legislature: Communities that Rely upon a Contaminated Groundwater Source (2013)*

Anthropogenic = Caused by Humans!

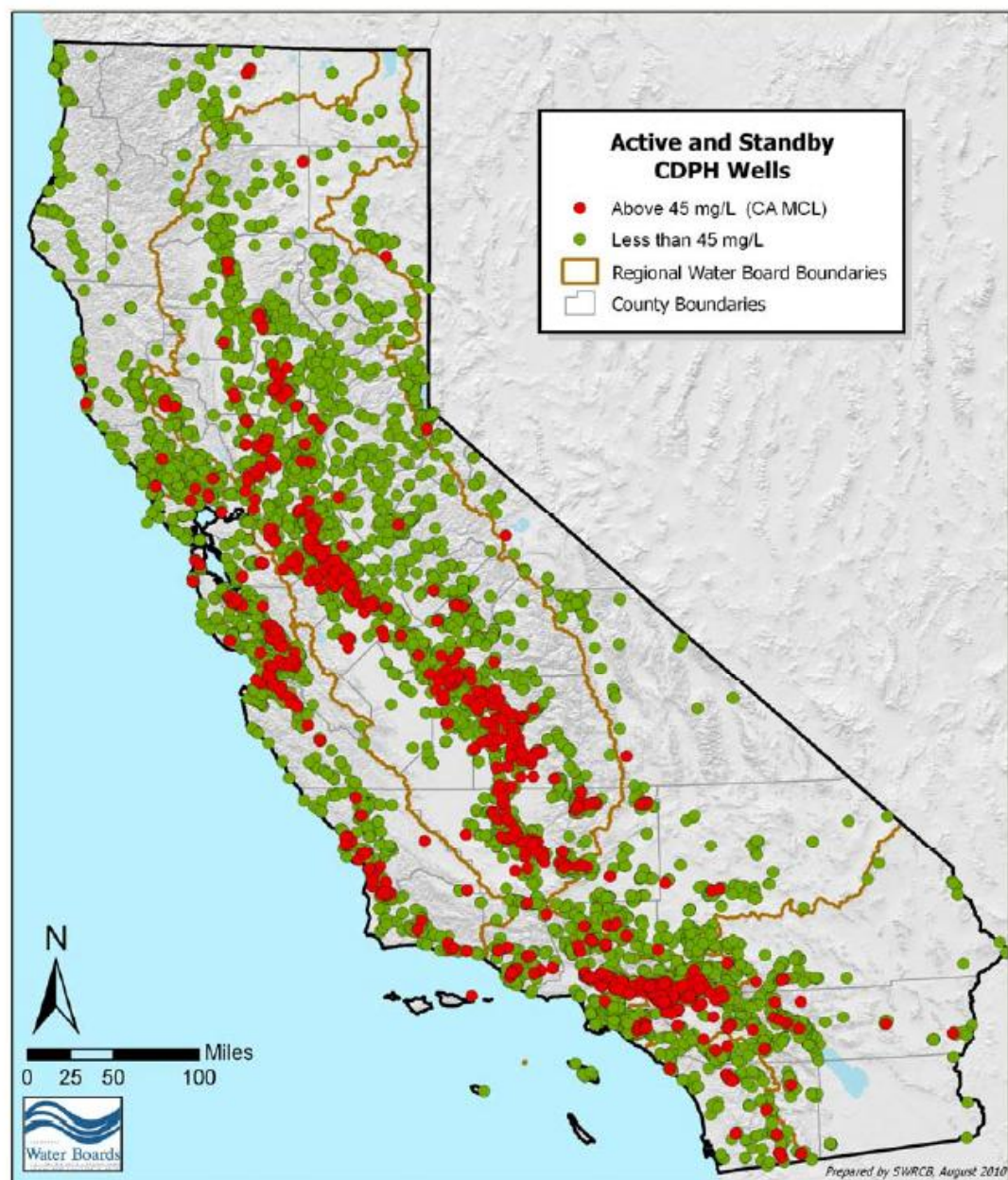


# All wells with a result above MCL

(6767 of 54,135 wells)





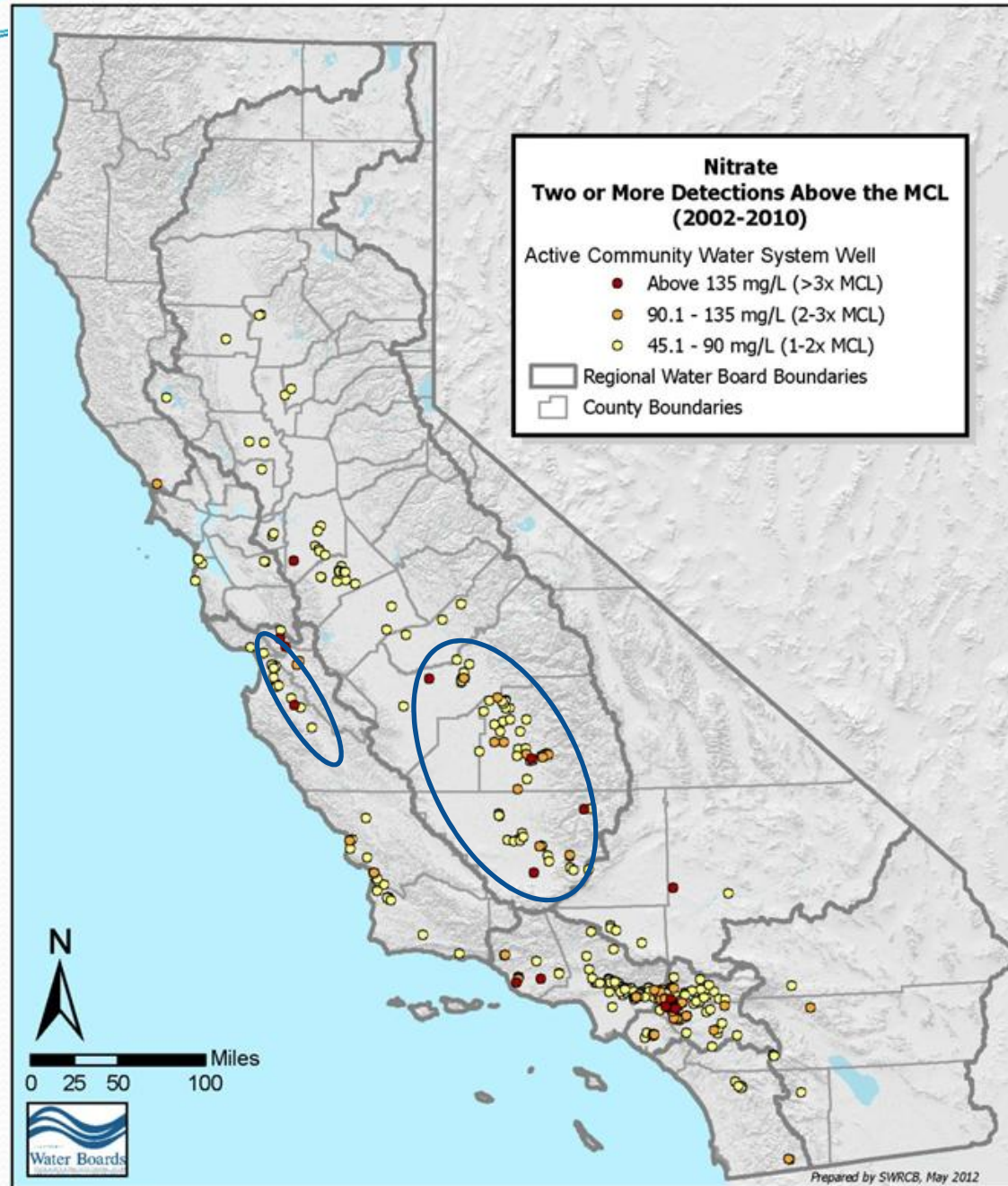


**Active and Standby CDPH Regulated Public Drinking Water Wells with at Least One Detection of Nitrate (as  $\text{NO}_3$ ) Above the MCL (1,077).**

Source: June 2010 well query of CDPH data using GeoTracker GAMA.



# Nitrate in Groundwater Sources



# What Prompted Nitrate Report?

- The Legislation:
  - Requires development of “pilot projects” focusing on nitrate in groundwater in the Tulare Lake Basin and Salinas Valley
  - Submit a report to the Legislature on the scope and findings of the pilot projects, including recommendations.
- State Water Board enters into agreement with UC Davis
- UC Davis Report published March 2012



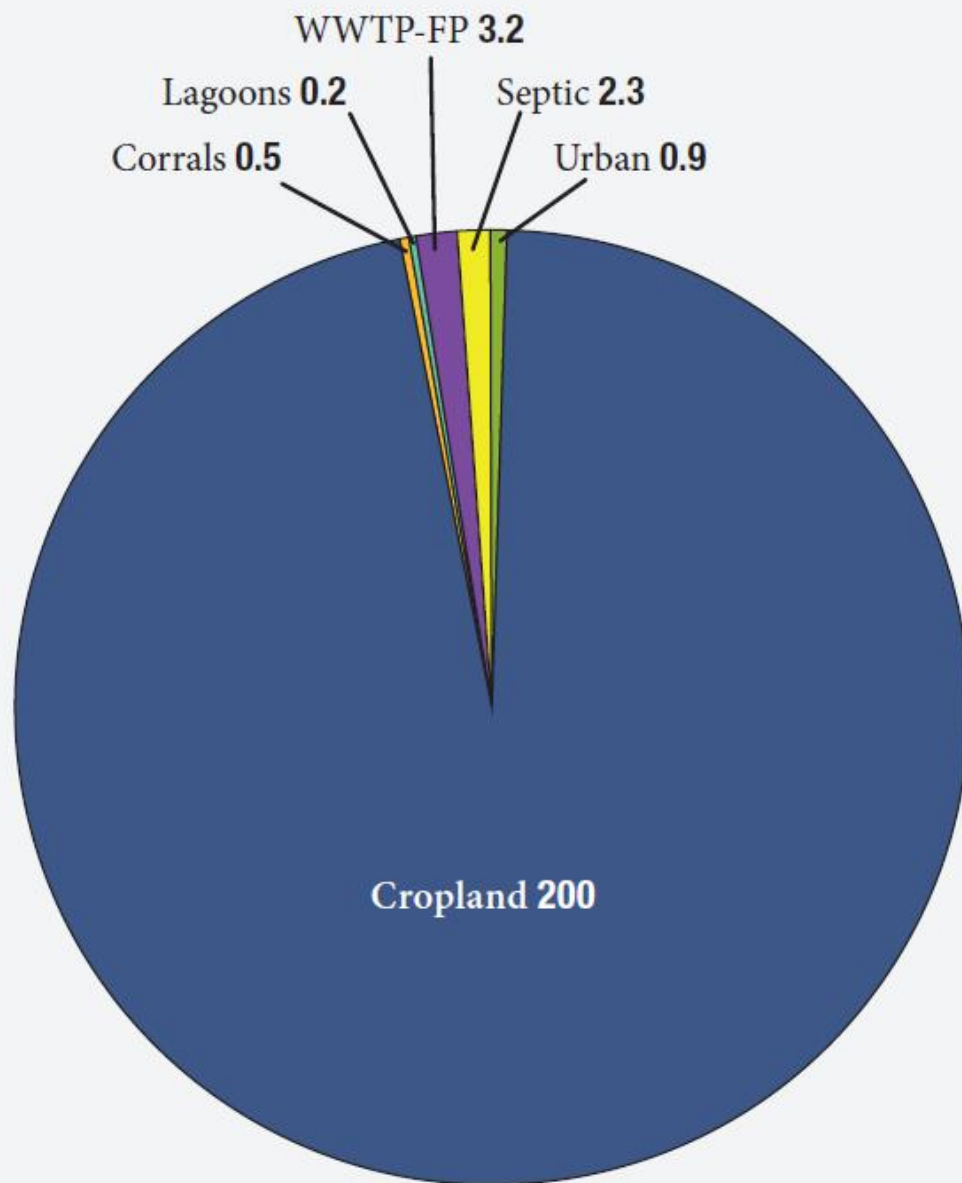


# UC Davis Nitrate Report Key Findings

- Nitrate problems will likely worsen
- Fertilizing materials applied to cropland are largest sources of nitrate
- Nitrate loading reductions are possible
- Remediation is extremely costly and not technically feasible
- Drinking water treatment are more cost-effective
- Many small communities cannot afford safe drinking water treatment and supply actions
- Most promising revenue source is a fee on nitrogen fertilizer use



# Nitrate Sources in Pilot Study Areas



# Recommendations

- Providing Safe Drinking Water
- Monitoring, Assessment, and Notification
- Nitrogen Tracking and Reporting System
- Protecting Groundwater

Link to Report -

[www.waterboards.ca.gov/water\\_issues/programs/nitrate\\_project/index.shtml](http://www.waterboards.ca.gov/water_issues/programs/nitrate_project/index.shtml)



# Next Steps for Water Boards

- Identify high-risk areas to prioritize regulatory oversight and assistance efforts in these areas
- Convene a panel of experts to assess existing agricultural nitrate control programs and develop recommendations
- Evaluate existing waste discharge permits (WDRs)
- Water Boards' Groundwater Strategic Workplan (*under development*)

# Additional Groundwater Information

<http://geotracker.waterboards.ca.gov/gama/>

<http://www.waterboards.ca.gov/gama/>

John Borkovich  
GAMA Program Manager





# Nitrate factoids

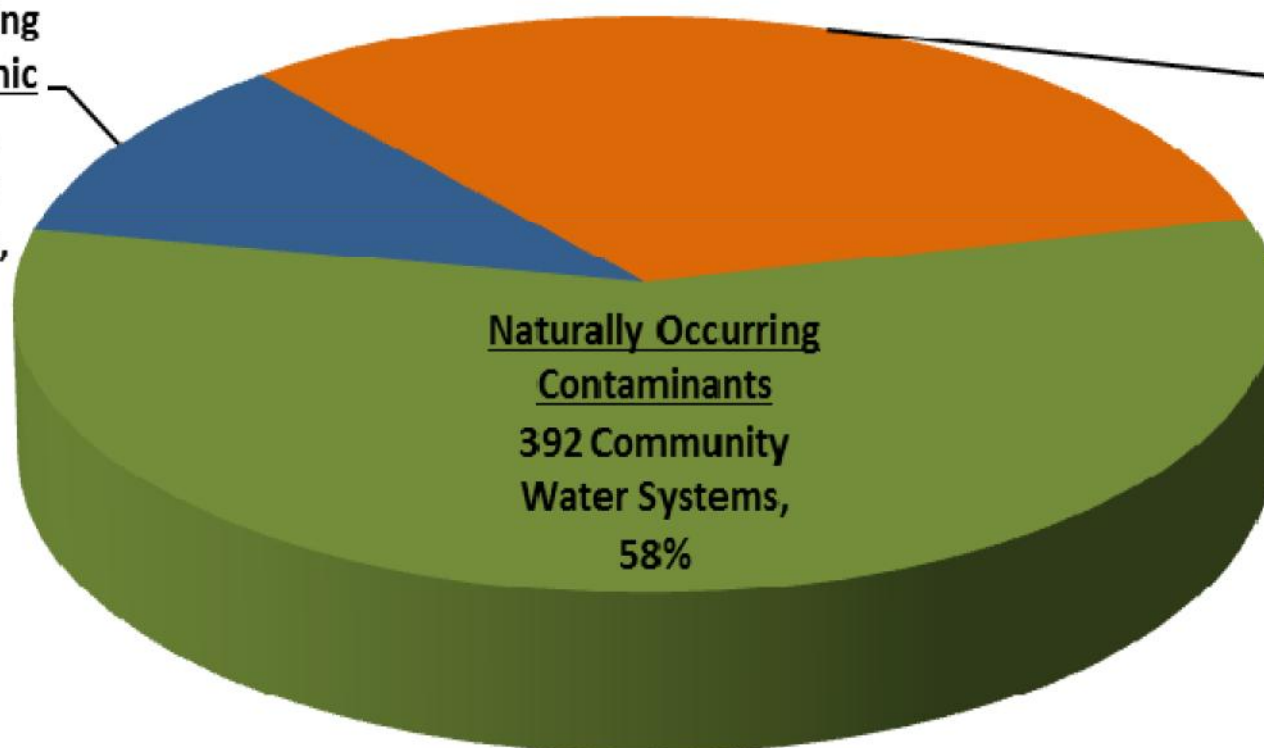
- Most prevalently detected anthropogenic chemical
- The largest source of anthropogenic nitrate is industrial production via the Haber-Bosch process.
- Other anthropogenic sources include septic systems, discharges from wastewater and agricultural ponds, leaky sewer lines, manure fertilizer application, and the production of explosives.
- Dissolves rapidly in water and is difficult to remove. Some natural degradation (denitrification) can occur under low or no-oxygen groundwater conditions.

# Chemical Type Detected

Two or More Detections Above the MCL  
in Active Wells  
2002-2010

Naturally Occurring  
and Anthropogenic  
Contaminants  
74 Community  
Water Systems,  
11%

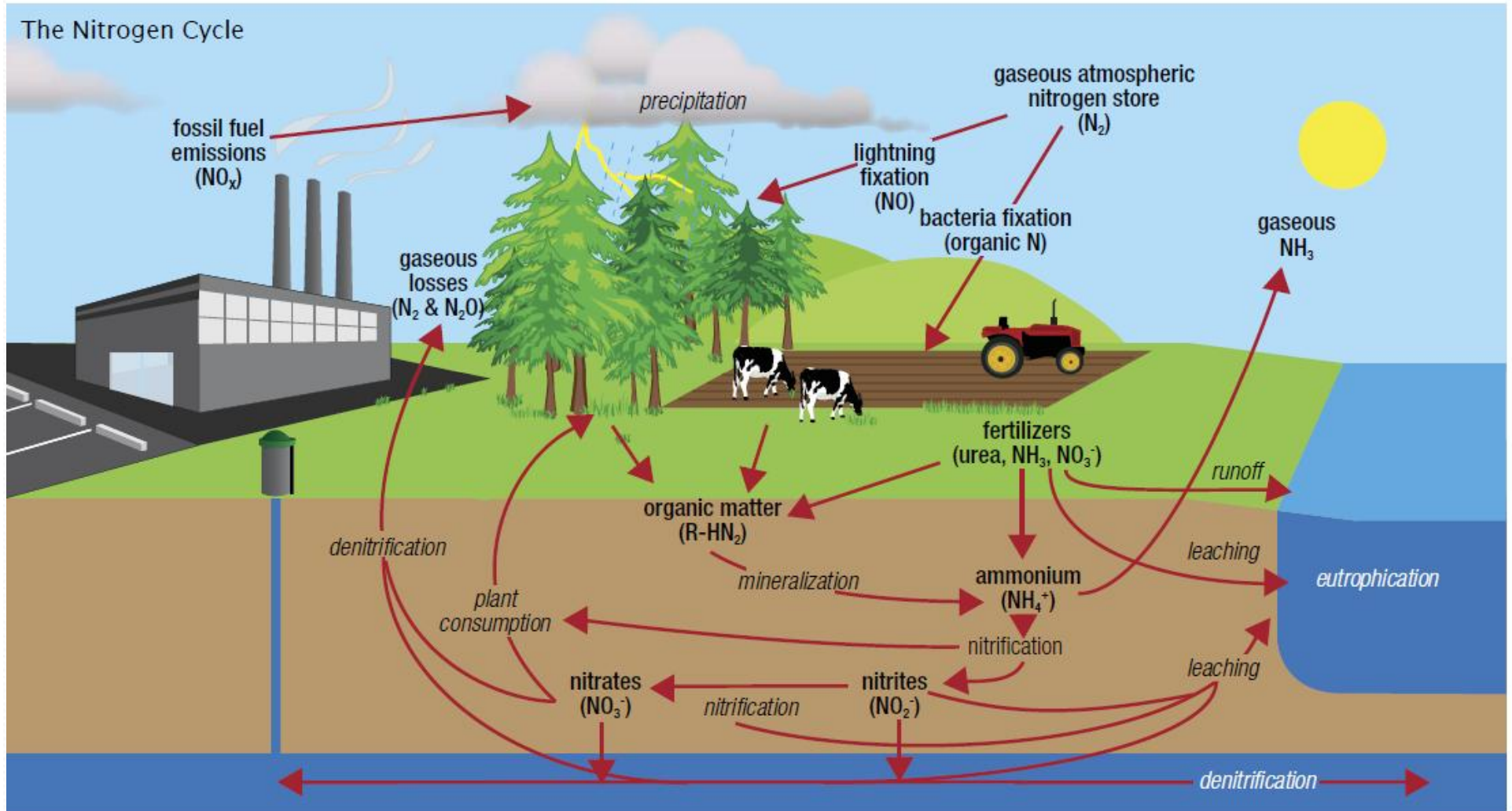
Anthropogenic  
Contaminants  
214 Community  
Water Systems,  
31%



Naturally Occurring  
Contaminants  
392 Community  
Water Systems,  
58%



# Nitrogen in the Environment



The nitrogen cycle illustrates the various forms and transformations of nitrogen compounds.